

EPA NEW ENGLAND REGIONAL LABORATORY ECOLOGY MONITORING TEAM CAPABILITIES

November 2014

The Ecology Monitoring Team (EMT) is responsible for overseeing monitoring and assessment programs in states and tribes, and working with our partners towards programs that can carry out Clean Water Act goals for monitoring and assessment. EMT has capabilities to monitor the water quality and ecological health of New England's streams, lakes, and estuaries, provide support to Regional program offices, and assist states and tribes with significant projects. The Ecology Monitoring Team assets also include the Biology Laboratory, a Mobile Biology Lab and a fleet of boats of various sizes. Specific assistance capabilities are as follows:

FIELD STUDIES (Contact: Diane Switzer, 617-918-8377)

Baseline or Ambient Water Quality Monitoring

- Water quality surveys of a defined water body to determine its chemical and biological condition. Basic parameters include temperature, dissolved oxygen, pH, nitrogen compounds, phosphorus, chlorophyll *a*, pathogens, and selected toxic compounds. Includes sample collection for chemical and biological analyses and water quality measurements using sondes and other field equipment.
- Sediment Oxygen Demand (SOD) studies of total benthic respiration of sediments in rivers, lakes, and estuaries.
- Remote-sensing buoy deployment for continuous monitoring of water quality including DO, temperature, conductivity, pH, chlorophyll, cyanobacteria and others.
- Wet weather monitoring to support stormwater or other ambient surveys; support in design and participation in wet weather effects on water quality can be provided.
- Field support using boats and/or Mobile Biology Lab.
- Cyanobacteria monitoring is currently being piloted in New England using hand-held fluorometers.

Biomonitoring

- Collection of macroinvertebrate and fish communities to assess impact and results of regulatory programs on aquatic systems, and provide guidance and support to state programs for development of biological criteria and bioassessment capabilities.
- Electro-fishing by boat, inflatable raft and back pack for fish community estimates and tissue contaminant analysis for human health and ecological risk assessments.
- Habitat quality evaluations are conducted in conjunction with biological sampling.

Time-of-Travel and Dispersion Studies

- Fluorescent dye is introduced into a water body and tracked to determine travel time between locations, or to determine dispersion and dilution throughout the water column. An ultra-sensitive fluorometer is used to track dye at very low concentrations. The data is used for developing mathematical models for waste load allocations, delineating impact zones, and determining shellfish closure lines.

Hydro Acoustic Mapping

- A BioSonics acoustic sensor is used by boat to accurately map bottom contours of waterbodies and a GIS contour map is produced. This technology can also be utilized to determine and map waterbody bottom compositions (i.e. sand, mud, silt, plant material, etc.) and plant areal coverage, biomass, and plant type to a certain extent. Output can be through GIS maps, Google Earth shared files, or csv data files.

Global Positioning System (GPS)

- State of the art GPS equipment is used to fix sample locations as a navigational aid, and to delineate electrofishing shock paths and dye tracks. Data downloaded into GIS is used to produce precise maps for reports and presentations.

Sediment Sampling

- Sediments collected may be surficial samples or sediment cores. Analyses can be conducted to determine if chemical contaminants are present, if they are exerting an oxygen demand upon the overlying water, if they are providing a contaminant flux into the water, if they must be treated as a hazardous material, or for historical rates of deposition.

Point Source Monitoring (Contact: Jerry Keefe, 617-918-8376)

- Sampling municipal or industrial discharges and/or at pipes of unknown origin to determine constituents in the waste stream. May be used for determining compliance with discharge permits, effects upon the receiving stream, and/or toxicity of the effluent. If stream effects are to be determined, this monitoring will be coupled with ambient water monitoring.

LABORATORY ANALYSIS (Contact: Dave McDonald, 617-918-8609)

Toxicity Testing

- Freshwater acute and chronic fathead minnow and *Ceriodaphnia* chronic tests for determining the toxicity of ambient waters, whole effluents, leachates, and sediment pore water. Studies are used for NPDES permits, TMDLs, compliance and enforcement activities, toxicity screening, place-based initiatives, RCRA and Superfund site investigations, ambient water monitoring, and nonpoint source investigations.
- Whole sediment toxicity tests using the amphipod *Hyalella azteca* and the midgefly larvae *Chironomus dilutus*. Test results are used to support ecological assessments of ambient sites and ecological risk assessments of RCRA and Superfund, hazardous and potentially hazardous waste sites.

Microbiology

- Total and fecal coliform, *Enterococci*, and *E. coli* analysis are performed using both defined substrate and membrane filtration techniques to support ambient surface water monitoring, compliance and enforcement, non-point source investigations, and drinking water.
- Microbiological certification of state drinking water laboratories.

Chlorophyll *a* Analysis

- Analysis of surface waters can be performed for chlorophyll *a* to assist in water quality monitoring and strategy development.

Low Level Total Mercury Analysis

- Low level mercury analysis of biological tissue and surface waters can be performed. Results can be used for water quality monitoring, food chain modelling, ecological risk assessment as well as bioaccumulation and bio-magnification evaluations.

Chemical Analysis (Contact: Dan Boudreau, 617-918-8340)

- Analysis of water, soil and sediment samples for metals, organics, and nutrients.

Flow-through Cytometry

- This capability allows for particle size analysis of plankton utilizing a laser triggered firewire microscope camera in conjunction with image recognition software and flow cell technology. Images can be stored in image libraries based on particle size, shape, or other physical characteristics, and summary statistics run on samples.

Other Lab Capabilities

- Grain size analysis and composition
- Fish tissue processing
- PCR consultation

OTHER CAPABILITIES (Contact: Diane Switzer, 617-918-8377)

- Statistical analysis of biological data
- GIS data mapping
- Study design
- QA/QC/document review
- QAPP and SOP preparation

All of the above field and laboratory activities may be used separately or in combination with one another depending upon the data use needs. The supplied data may be used for problem identification, determining compliance with state water quality standards, developing mathematical models for load allocations, preparing land use management plans, and reporting on the general health of New England's freshwater and near coastal environments. All support contingent on resources and staff availability.

Contact: Katrina Kipp, 617-918-8309 or Diane Switzer, 617-918-8377